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**5f. WORK UNIT NUMBER**

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The views, opinions and/or findings contained in this report are those of the author(s) and should not contrued as an official Department of the Army position, policy or decision, unless so designated by other documentation.

**14. ABSTRACT**
We worked on a tapered fiber in cold atomic cloud setup. At the end of this program, we had built the vacuum system, specialized cold atom chamber and were working on the fiber epoxy mount for the tapered fiber. We had also trained one student in how to produce sub micron tapered fibers and a 70 OD 2D MOT.

**15. SUBJECT TERMS**
Tapered Fibers, Cold atoms, Nonlinear Optics

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| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | John Howell |
| UU | UU | UU | UU | | 19b. TELEPHONE NUMBER 585-275-8559 |

**Report Title**

Final Report: STIR-Physics: Cold Atoms and Nanocrystals in Tapered Nanofiber and High-Q Resonator Potentials

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We worked on a tapered fiber in cold atomic cloud setup. At the end of this program, we had built the vacuum system, specialized cold atom chamber and were working on the fiber epoxy mount for the tapered fiber. We had also trained one student in how to produce sub micron tapered fibers and a 70 OD 2D MOT.

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## Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

### (a) Papers published in peer-reviewed journals (N/A for none)

Received Paper

**TOTAL:**

**Number of Papers published in peer-reviewed journals:**

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### (b) Papers published in non-peer-reviewed journals (N/A for none)

Received Paper

**TOTAL:**

**Number of Papers published in non peer-reviewed journals:**

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### (c) Presentations

**Number of Presentations:** 0.00

## Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

**TOTAL:**

**Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):**

## Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received Paper

**TOTAL:**

**Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):**

## (d) Manuscripts

Received Paper

**TOTAL:**

**Number of Manuscripts:**

## Books

Received Book

**TOTAL:**

| Received | Book Chapter |
|---|---|

**TOTAL:**

## Patents Submitted

## Patents Awarded

## Awards

### Graduate Students

| NAME | PERCENT_SUPPORTED |
|---|---|

**FTE Equivalent:**
**Total Number:**

### Names of Post Doctorates

| NAME | PERCENT_SUPPORTED |
|---|---|

**FTE Equivalent:**
**Total Number:**

### Names of Faculty Supported

| NAME | PERCENT_SUPPORTED |
|---|---|

**FTE Equivalent:**
**Total Number:**

### Names of Under Graduate students supported

| NAME | PERCENT_SUPPORTED |
|---|---|

**FTE Equivalent:**
**Total Number:**

## Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: ..... 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense ..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: ..... 0.00

## Names of Personnel receiving masters degrees

NAME

**Total Number:**

## Names of personnel receiving PHDs

NAME

**Total Number:**

## Names of other research staff

| NAME | PERCENT_SUPPORTED |
|---|---|

**FTE Equivalent:**

**Total Number:**

## Sub Contractors (DD882)

## Inventions (DD882)

## Scientific Progress

Most major components completed individually
-Tapered Fiber
-High OD MOT
-Vacuum chamber with specialized atomic chamber

Were developing tapered fiber mount at the end of the program

Side Effort: Explored pulse reflection from a temporally moving boundary. There is a temporal analog of reflection from an interface. However, rather than conserving energy and changing momentum upon reflection, a temporal pulse scatters from a moving boundary and conserves momentum, but not energy. We didn't actually see it, unfortunately.

# Technology Transfer